



# IOT Based Monitoring and Controlling of Substitution Equipment

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**ABSTRACT:** Power is generated at power plant and is used to be carried out by transmission line to the distribution substation. The substation steps down the voltage through the transformer and distributes it to the different area. We need to monitor the parameters of distribution line like current, voltage, power and temperature of the substation. So, we have made a system where we can monitor all these parameters on the LCD (Liquid Crystal Display) using IOT (Internet of Things) modules.

Then after suppose there is a fault in the distribution line say short circuit then we are making a system which can trip the particular distribution line in case of fault. After that alarm and indicator in the substation will become on alarm the people about the fault in the particular area where the fault has been occurred and fault will be sensed by using different types of sensors like current sensor(ACS 712), voltage sensor(25 V) and temperature sensor(LM 35).

**KEYWORDS:** Current Sensor, Voltage Sensor, Temperature Sensor and IOT

## I. INTRODUCTION

Electricity is a particularly convenient and useful form of energy. It plays an ever growing character in our modern industrialized society. The electrical power systems are highly non-linear, enormously vast and multifarious links. Electric power systems are incorporated for financial assistances, improved consistency and operative compensations. They are one of the supreme substantial fundamentals of both domestic and worldwide organization, and when these systems breakdown it leads to major direct and indirect impacts on the economy and national security. A power system involves of mechanisms like generators, lines, transformers, loads, switches and compensators. Though, a generally isolated power sources and loads are the general formation of modern power systems. Nowadays electricity quiet aches from power outages and blackouts due to the lack of mechanical breakdown and unfortunate reflectiveness of the value over the grid.

This project is design to protect electrical circuitry by using relay. This relay operates when electrical parameters exceeds the predefined limits. Also, this project makes use of microcontroller to control efficiently and communicate with different sensors. When we give supply to system then all sensor will start sensing the current, voltage, temperature and frequency also update all real time values to server as well as shows on LCD and application (android and web app). It compares all the real time values with pre-define values and if any of the value get exceeds then it sends fault alert to relay and buzzer as well as update it on display. Also, system will check the oil level through ultrasonic sensor which helps admin to change the oil from transform that's how the system will improve efficiency of substation and it will protect substation from any damage.

## II. RELATED WORK

Monitoring and controlling substation system is use to monitoring the substation equipment's temperature, humidity and oil level, it is essential to maintain the equipment's time to time otherwise it will cause damage to whole substation as well as in human life , when the faults get occurs. The system works on 5V power supply to ESP32. ESP 32 is microcontroller of this system. For measuring the temperature we are going to use DTH11 sensor and for

measuring oil quality level we are going to use LDR sensor and Ultrasonic sensor. DHT11 is continuously monitor the temperature and when temperature is get exceed then relay will automatically get ON and circuit break will tripped and load get 0. In substation it is important to maintain oil quality of transformer. Through LDR we can check the quality of oil . LDR detect oil with different colors such as if transformer oil color is red that means it's new and it will indicate no need to change oil and if transformer oil color is red that means it's old with low level and it's time to change the oil then ultrasonic gives indication to microcontroller. All data related to substation such as temperature and oil level will be send to microcontroller then microcontroller will send to LCD as well as application (android and web application).

### III. METHODOLOGY

The purpose of this project to monitor real time values of substation such as temperature, voltage and oil level and send it to android application or web app. This project is design to protect electrical circuitry by using relay. This relay operates when electrical parameters exceeds the predefined limits. Also, this project makes use of microcontroller to control efficiently and communicate with different sensors. When we give supply to system then all sensor will start sensing the current, voltage, temperature and frequency also update all real time values to server as well as shows on LCD and application (android and web app). It compares all the real time values with pre-define values and if any of the value get exceeds then it sends fault alert to relay and buzzer as well as update it on display. Also, system will check the oil level through ultrasonic sensor which helps admin to change the oil from transform that's how the system will improve efficiency of substation and it will protect substation from any damage.

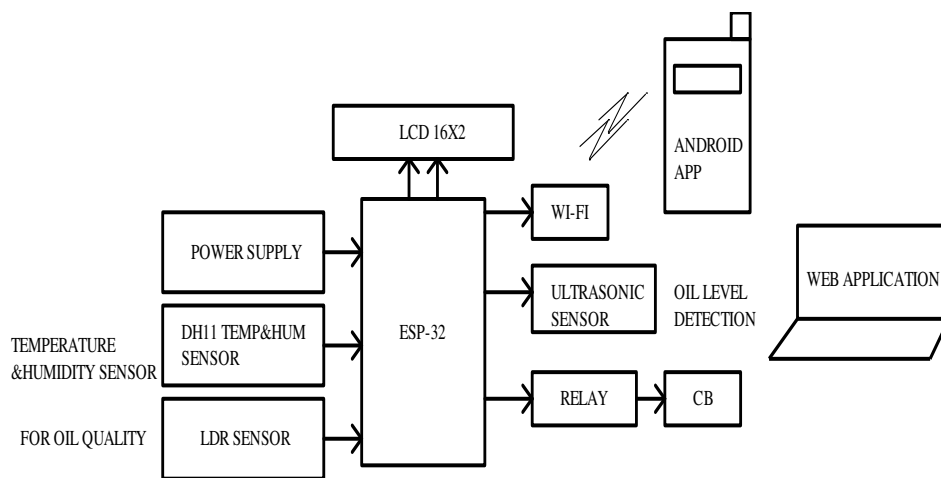
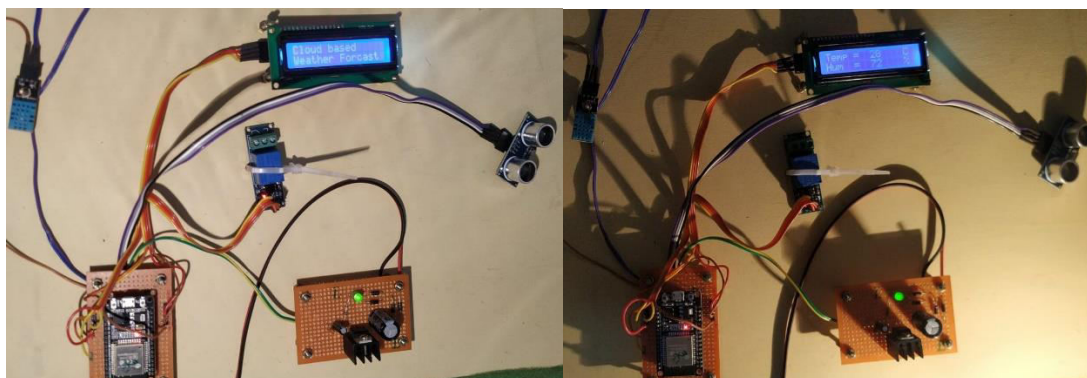
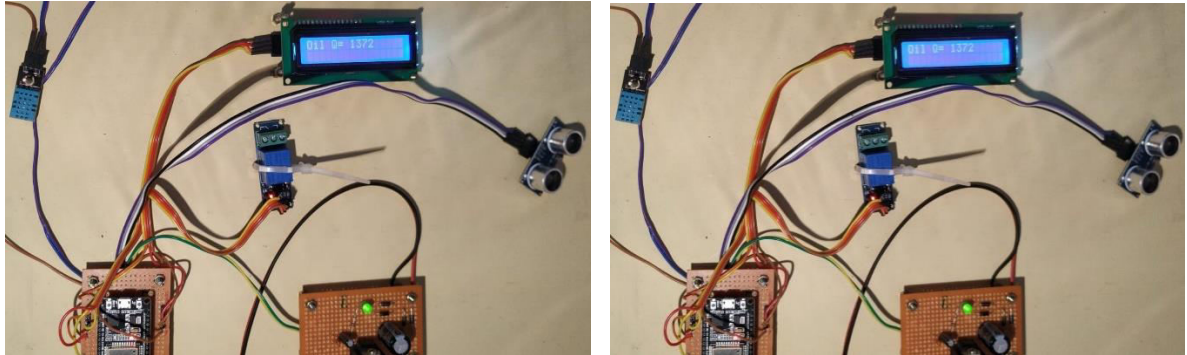


Fig 2.1 Block Diagram

### IV. EXPERIMENTAL RESULTS





## V. CONCLUSION

Monitoring means obtaining major constraints from the properties of concern, the obtaining data is possible to be used for analyses and diagnose the condition of the properties which is of excessive usage for maintenance development, failure management and controlling system. This method minimizes time contact between human and voltage device. Most substations devices have high voltage and generate electromagnetic that can harm human health. The proposed system is design to monitoring the condition of substation transformers which are deployed at distributed sites there are numerous parameters to be quantified and examined intermittently it is pretty expensive and challenging to monitor the constraints by hiring a person at all sites and also the data would also be error prone if the monitoring is manual. The greatest issue is to have all the transformers data at a single sink when the data is collected manually. Concluded our proposed system all the complications conferred above can be compact to some excessive level.

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